REMARKS

The Office Action mailed November 6, 2001 has been reviewed and carefully considered. Claim 9 is cancelled. Claims 5 and 8 have been amended. Claims 5 and 8 are pending in this application, with claim 5 being the only independent claim. Reconsideration of the above-identified application, as herein amended and in view of the following remarks, is respectfully requested.

In the Office Action mailed November 6, 2001, claims 5, 8, and 9 stand rejected under 35 U.S.C. §103 as unpatentable over Simsek, "Dynamic Simulation of Dual-Line Continuous Strip Processing Operations" in view of U.S. Patent No. 5,509,460 (Chun).

Before discussing the cited prior art and the Examiner's rejections of the claims in view of that art, a brief summary of the present invention is appropriate. The present invention relates to a method for determining and controlling the material flow of continuous-cast slabs by monitoring and optimizing the temperature on the transport path between the casting installation and the rolling mills. According to the invention, the temperature of the liquid phase of the continuous-cast slab at the mold exit of the continuous-casting installation, the physical parameters of the slab, and the surface temperature of the continuous-cast slab are determined. The amount of heat and a temperature profile of the continuous cast slab are then calculated using convective mixing of heat and the time-dependent heat loss. The material flow of the continuous cast slabs are then controlled on their transport path between the continuous casting installation and the rolling mills by a slab monitoring system. The term "material flow" is defined in the specification to be the movement of the continuous slab through various processes between the casting installation and the rolling mills (see pg. 3, lines 20-22). The amount of heat, the

temperature profile and the surface temperature of the slab are used as inputs to the slab monitoring system.

Independent claim 1 has been amended to include the limitations of independent claim 9 and now recites "determining a surface temperature of the continuous-cast slab". Claim 1 has further been clarified to indicate that the material flow relates to the flow of the slab through the area between the continuous-casting installation and the roll mills and now recites "controlling the material flow of the continuous-cast slab between the continuous-casting installation and rolling mills via a slab-monitoring system of the continuous-casting installation and using the surface temperature of the slab determined in said step a. and the amount of heat and the temperature profile determined in said step b. as an input to the slab-monitoring system". It is respectfully submitted that the amendments to the claims do not require further search and/or consideration because these limitations were already claimed in the original claims. The determination of the surface temperature was originally claimed in claim 9 and the clarification of the term material flow was already in the preamble of original claim 1, as well as being defined in the specification. Accordingly, entrance of these amendments is respectfully requested.

Neither Simsek nor Chung disclose the step of controlling the material flow of the continuous slab between the continuous casting installation and the rolling mills.

Simsek discloses a simulation of dual-line continuous strip processing operations in which finite element numerical techniques are used to calculate the minimum heating time requirements for a range of casting speeds. As stated in the Office Action, Simsek fails to disclose the steps of determining the temperature of the fluid phase after casting and physical parameters of the slab and fails to disclose controlling the material flow of the slab from the

casting installation to the roll mills using a slab monitoring system. Accordingly, independent claim 1 is allowable over Simsek taken by itself.

Chung also fails to disclose the step of controlling the material flow of the slab from the casting installation to the roll mills using a slab monitoring system. Chung discloses a device and method for detecting a solid/liquid interface in a continuous cast slab at the exit of the casting device. Chung teaches that this information is used to control the casting machine, thereby controlling the formation of the strand (see col. 5, lines 40-50). That is Chung controls the formation of the strand so that the metal tongue remains at a desired stationary position as the strand is pulled through the mold. Since Chung teaches the control of the formation of the strand at the casting machine, Chung fails to teach or suggest the step of controlling the material flow of the continuous-cast slab from the casting installation to the rolling mills based on the surface temperature of the slab, the determined amount of heat and the determined temperature profile, as recited in independent claim 5. Accordingly, it is respectfully submitted that independent claim 5 is allowable over Simsek in view of Chung.

Dependent claim 8, being dependent on independent claim 5, is allowable for the sane reasons as independent claim 5.

The application is now deemed to be in condition for allowance and notice to that effect is solicited.

It is believed that no fees or charges are required at this time in connection with the present application; however, if any fees or charges are required at this time, they may be charged to our Patent and Trademark Office Deposit Account No. 03-2412.

Respectfully submitted,

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AMENDMENTS TO THE SPECIFICATION AND CLAIMS SHOWING CHANGES

In the Claims:

Amend claims 5 and 8 as follows:

--5. (Twice Amended) A method for determining and controlling the material flow of continuous-cast slabs [in a continuous casting installation] by monitoring and optimizing the temperature on the transport path of the continuous-cast slabs between the continuous-casting installation and a rolling mill, said method comprising the steps of :

a. determining a temperature of the liquid phase of the continuous-cast slab at a mold exit of the continuous-casting installation and physical parameters of the continuous-cast slab including temperature-dependent material values comprising at least one of density ρ, specific heat C_p, thermal conductivity λ, and scale properties and determining a surface temperature of the continuous-cast slab;

b. determining an amount of heat and a temperature profile of the continuous-cast slab by calculating the convective mixing of the amount of heat contained in the continuous-cast slab and the time-dependent heat loss from the inhomogenously cooling of the continuous-cast slab, wherein the step of calculating comprises using a mathematical-physical model calculated using one of a two-dimensional finite element method, a finite difference method, and software using formulas derived from off-line studies; and

c. controlling the material flow of the continuous-cast slab between [in] the continuous-casting installation and rolling mills via a slab-monitoring system of the continuous-casting installation and using the surface temperature of the slab determined in said step a. and the amount of heat and the temperature profile determined in said step b. as an input to the slab-monitoring system.--

--8. (Twice Amended) The method of claim 5, wherein [said step a. further comprises determining a surface temperature of the continuous-cast slab, said step c. comprises using a surface temperature of the continuous-cast slab determined in said step a. as an input to the slab monitoring system, and] said step c. further comprises automatically controlling the material flow via the slab monitoring system based on the amount of heat and the temperature profile determined in said step b. and the surface temperature of the continuous-cast slab.--